MILLIMETER AND SUBMILLIMETER WAVE SPECTRA OF N-METHYLFORMAMIDE AND PROPIONAMIDE[a]

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We present the rotational spectra studies of two acetamide conjugated molecules, namely, N-methylformamide (CH_3NHCHO) and propionamide ($CH_3CH_2CONH_2$). New measurements have been performed in the frequency range 50 – 150 GHz using the spectrometer in Kharkov, and in the frequency range 150 – 630 GHz using the spectrometer in Lille. The analysis of the rotational spectra of both molecules is complicated by the methyl top internal rotation and nuclear quadrupole hyperfine structure. In case of N-methylformamide the barrier to internal rotation is relatively small, V_3 = 51.7 cm^{-1}, whereas for propionamide the barrier is high, V_3 = 751.9 cm^{-1}. For propionamide the presence of the low-lying excited vibrational state (60 cm^{-1}) makes difficult the analysis within the classical rho-axis method Hamiltonian. In this case only the rotational transitions with $K_a < 10$ could be fitted within experimental accuracy. The rotational spectra of both molecules were analyzed using modified version of the RAM36 code, taking nuclear quadrupole hyperfine coupling into account. Details of the new study and problems encountered in the analysis will be discussed.

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